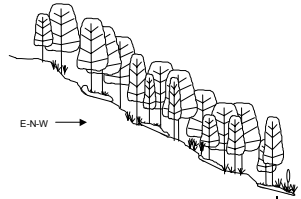


B. MODERATELY-MOIST FORESTS (FL)

FL01. **FIR-DOUGLAS-FIR/PACHISTIMA-MODERATELY COLD SOILS** (ABBI2-PSME/PAMY). Subalpine fir-Douglas-fir/pachistima–Thin-dark Cryoboralfs and Cryoborolls–Moderately steep slopes, 9,300-10,300 ft



NUMBER OF SAMPLES	10, soil descriptions from 5 of these; 1 plot not assigned to a CT (total 11)
ELEVATION	9,824 ft (9,320-10,235 ft); 2,994 m (2,841-3,119 m)
AVERAGE ASPECT	251°M (r = 0.36)
LITHOLOGY	Igneous: granite-gneiss [57%] or sedimentary: sandstone-siltstone-shale [43%]
FORMATIONS ¹	A variety
LANDFORMS	Soil creep slopes
SLOPE POSITIONS	Backslopes and lower backslopes
SLOPE SHAPES	Linear both horizontally and vertically
SLOPE ANGLE	22.3% (16-38%)
SOIL PARENT MATERIAL	Mostly colluvium [80%]
COARSE FRAGMENTS	2.5% (0-7%) cover on surface, 55.1% (25-77%) by volume in soil
SOIL DEPTH	81 cm (59-101 cm); 31.7 in (23-40 in)
MOLLIC THICKNESS	15 cm (3-33 cm); 6.0 in (1-13 in)
TEXTURE	Loam, organic, clay loam, or silty clay loam surface; clay, sandy clay loam, or clay loam subsurface
SOIL CLASSIFICATION	Cryoboralfs [80%] or Argic Cryoborolls
TOTAL LIVE COVER	279.0% (197.0-409.5%)
NUMBER OF SPECIES	20.6 (12-31)
TOTAL LIVE COVER/NO. SPECIES	14.7% (8.2-22.8%)
CLIMATE	Either outside rainshadow or just into a light partial rainshadow. Cool, moderately moist to moist forest.
WATER	The common aspen cover, large number of layers, and often abundant litter and duff maintain considerable moisture in these stands.

Key to Community Types

1. Douglas-fir >70%, dominant over aspen and subalpine fir. Pachistima <10% **A**
1. Douglas-fir not dominant, <50%..... (2)

2. Aspen dominant, >55%. Douglas-fir usually >5%, sometimes absent. Lodgepole pine up to 30%, sometimes absent. Subalpine fir up to 55%, sometimes sparse or absent..... **B**
2. Lodgepole pine dominant, >40%. Aspen conspicuous subdominant, >20%..... **C**

Community Type Descriptions

- A** *Douglas-fir-subalpine fir-aspen-elm sedge-pachistima-rose* is dominated by Douglas-fir at >70% cover. Aspen and subalpine fir are both present, at up to 25% cover.
- B** *Aspen-pachistima-lupine* is dominated by aspen, at >55% cover. Other tree species (subalpine fir, Engelmann spruce, lodgepole pine) are subordinate and sometimes one or more of them is absent.
- C** *Lodgepole pine-aspen-common juniper-pachistima-elm sedge* is dominated by lodgepole pine at >40% cover. One plot has Douglas-fir codominant and aspen subdominant; lodgepole pine and aspen are the only trees present in the other plot. One plot is a permanent *disclimax*, in which persistent and/or severe fires have removed seed sources of subalpine fir and Douglas-fir; perhaps disease has played a part as well.

Communities Not Assigned to a Community Type

- One community is dominated by subalpine fir, with noticeable pachistima and whortleberry. This would fall into community type A except Douglas-fir is not present. Perhaps the seed source for Douglas-fir has been eliminated.

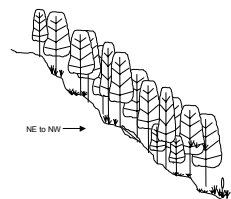
Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Douglas-fir-subalpine fir-aspen-elm sedge-pachistima-rose	9,590 (9,540-9,640) 19.5 (16-23)	69 (62-77) 74 (59-89) 23 (12-33)	7 0 LS	121 (108-134) 40 (37-42) 52 (20-84) 6 (1-12)	24 (23-24) 219 (197-241) 9.3 (8.2-10.5)
B. Aspen-pachistima-lupine	9,941 (9,320-10,235) 23.7 (16-38)	41 (25-56) 87 (73-101) 8 (3-13)	3 * EM	104 (88-158) 69 (4-126) 65 (0-111) 66 (13-114)	22 (16-31) 304 (207-410) 14.7 (9.0-22.8)
C. Lodgepole pine-aspen-common juniper-pachistima-elm sedge	* *	* * *	* * EM	96 (80-112) 63 (55-71) 68 (56-80) 37 (22-52)	13 (12-14) 263 (258-269) 20.3 (19.2-21.5)

*. Unknown: measurements were not taken in this CT.

TREES			FORBS		
ABBI2	<i>Abies bifolia</i>	subalpine fir	ARCO9	<i>Arnica cordifolia</i>	heartleaf arnica
PICO	<i>Pinus contorta</i>	lodgepole pine	CHDA2	<i>Chamerion danielsii</i>	fireweed
POTR5	<i>Populus tremuloides</i>	quaking aspen	CHLOR	<i>Chlorocrepis</i>	hawkweed
PSME	<i>Pseudotsuga menziesii</i>	Douglas-fir	FRV1	<i>Fragaria virginiana</i>	Virginia strawberry
SHRUBS			GERI	<i>Geranium richardsonii</i>	Richardson geranium
ARUV	<i>Arctostaphylos uva-ursi</i>	kinnikinnick	LAL2	<i>Lathyrus leucanthus</i>	aspen peavine
JUCO6	<i>Juniperus communis</i>	common juniper	LUAR3	<i>Lupinus argenteus</i>	silvery lupine
PAMY	<i>Paxistima myrsinites</i>	mountain-lover	MAAM6	<i>Maianthemum amplexicaule</i>	feather Solomon-plume
RIIN2	<i>Ribes inerme</i>	whitestem currant	ORPA3	<i>Oreochrysum parryi</i>	Parry goldenweed
ROWO	<i>Rosa woodsii</i>	Woods rose	OSDE	<i>Osmorhiza depauperata</i>	sweet cicely
SASC	<i>Salix scouleriana</i>	Scouler willow	PEPA3	<i>Pedicularis parryi</i>	Parry lousewort
SAMI15	<i>Sambucus microbotrys</i>	mountain red elderberry	SESE2	<i>Senecio serra</i>	butterweed groundsel
SYRO	<i>Symphoricarpos rotundifolius</i>	mountain snowberry	VIAM	<i>Vicia americana</i>	American vetch
VAMO	<i>Vaccinium myrtillus</i> ssp. <i>oreophilum</i>	Rocky Mountain whortleberry			
GRAMINOIDS					
BRCA10	<i>Bromopsis canadensis</i>	fringed brome			
CAGE2	<i>Carex geyeri</i>	elm sedge			
FETH	<i>Festuca thurberi</i>	Thurber fescue			

FL02. FIR/TWINFLOWER–COLD LIGHT-COLORED SOILS–STEEP NORTHERLY (ABBI2/LIBO3).

Subalpine fir/twinflower–Cryochrepts and Cryoboralfs–Steep northerly slopes, 9,100-10,100 ft



NUMBER OF SAMPLES	8, soil descriptions from 4 of these (total 8)
ELEVATION	9,775 ft (9,160-10,020 ft); 2,979 m (2,792-3,054 m)
AVERAGE ASPECT	351°M (r = 0.79)
LITHOLOGY	Granite, tuff, or rhyolite
FORMATIONS¹	Tmi, Taf, Tpl
LANDFORMS	Soil creep slopes [75%]
SLOPE POSITIONS	Backslopes
SLOPE SHAPES	Undulating, convex, or concave horizontally, Linear to undulating vertically
SLOPE ANGLE	50.3% (45-60%)
SOIL PARENT MATERIAL	Colluvium
COARSE FRAGMENTS	4.3% (0-10%) cover on surface, 63.3% (56-73%) by volume in soil
SOIL DEPTH	75 cm (61-84 cm); 29.4 in (24-33 in)
MOLLIC THICKNESS	13 cm (0-42 cm); 4.9 in (0-17 in)
TEXTURE	Clay loam, sandy clay loam, or loam surface; sandy clay loam, sandy loam, clay loam, or loamy sand subsurface
SOIL CLASSIFICATION	Cryochrepts [50%] or Cryoboralfs
TOTAL LIVE COVER	212.6% (141.1-272.5%)
NUMBER OF SPECIES	20.9 (12-30)
TOTAL LIVE COVER/NO. SPECIES	11.3% (4.7-19.6%)
CLIMATE	In deep rainshadow or partial rainshadow. Cool, moist, not exposed to sun, not exposed to wind.
WATER	The highly shaded understory, number of layers, and copious litter and duff retain much moisture through the growing season.

Key to Community Types

1. Douglas-fir >15%; whortleberry sometimes absent..... **A**
1. Douglas-fir absent; whortleberry always present (2)
2. Lodgepole pine dominant, >60%. Engelmann spruce absent **C**
2. Fir or spruce dominant, >35%, Lodgepole pine subordinate **B**

Description of Community Types

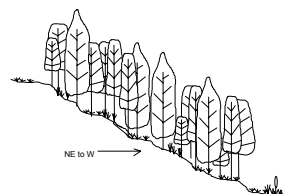
- A** *Douglas-fir-aspen-common juniper-twinflower* Douglas-fir cover is >15% in a mixed stand of Douglas-fir, aspen, Engelmann spruce, subalpine fir, and lodgepole pine. Twinflower cover is >15%.
- B** *Engelmann spruce-subalpine fir-lodgepole pine-whortleberry-twinflower* is dominated by subalpine fir or Engelmann spruce, one or both of which has >35% cover. Douglas-fir is absent. Lodgepole pine is always present, with as much as 35% cover. Aspen is uncommonly present. Twinflower cover is 3-20%. Rocky Mountain whortleberry is conspicuous at 30-90% cover. Elk sedge is absent to conspicuous.
- C** *Lodgepole pine-aspen-common juniper-whortleberry-kinnikinnick-twinflower* is dominated by lodgepole pine, at >60% cover. Engelmann spruce, subalpine fir, and Douglas-fir may be absent or as much as 1% cover. Aspen is always present, and varies from minor to codominant. Twinflower cover is 5-25%. Rocky Mountain whortleberry is conspicuous, at >30% cover. Elk sedge cover is >10%.

Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Douglas-fir-aspen-common juniper-twinflower	9,530 (9,160-9,900) 55.7 (52-60)	61 (56-66) 80 (75-84) 21 (0-42)	5 (0-10) * LS	100 (93-104) 41 (11-90) 3 (0-7) 55 (27-72)	27 (25-30) 200 (141-273) 7.5 (4.7-10.5)
B. Engelmann spruce-subalpine fir-lodgepole pine-whortleberry-twinflower	10,020 45	65 (58-73) 70 (61-79) 4 (0-8)	7 1 LS-LM	92 (76-110) 80 (51-106) 17 (0-51) 25 (4-47)	19 (14-22) 215 (201-241) 11.8 (10.0-14.5)
C. Lodgepole pine-aspen-common juniper-whortleberry-kinnikinnick-twinflower	* *	* * *	* * EM	86 (67-105) 73 (65-81) 20 (15-25) 51 (40-61)	15 (12-18) 229 (224-235) 16.0 (12.4-19.6)

*. Unknown: measurements were not taken in this CT.

	TREES	
ABBI2	Abies bifolia	subalpine fir
PIEN	Picea engelmannii	Engelmann spruce
PICO	Pinus contorta	lodgepole pine
POTR5	Populus tremuloides	quaking aspen
PSME	Pseudotsuga menziesii	Douglas-fir
	SHRUBS	
ARUV	Arctostaphylos uva-ursi	kinnikinnick
JUCO6	Juniperus communis	common juniper
PAMY	Paxistima myrsinites	mountain-lover
ROWO	Rosa woodsii	Woods rose
SHCA	Shepherdia canadensis	russet buffaloberry
VAMYO	Vaccinium myrtillus ssp. oreophilum	Rocky Mountain whortleberry
	GRAMINOIDS	
CAGE2	Carex geyeri	elk sedge
CARO5	Carex rossii	Ross sedge
	FORBS	
ARCO9	Arnica cordifolia	heartleaf arnica
ASTRA	Astragalus	milkvetch
ERSP4	Erigeron speciosus	Oregon fleabane
FRV1	Fragaria virginiana	Virginia strawberry
LAL2	Lathyrus leucanthus	aspen peavine
LIBO3	Linnaea borealis	American twinflower
LUAR3	Lupinus argenteus	silvery lupine
SOLID	Solidago	goldenrod
SOSI3	Solidago simplex	Mt. Albert goldenrod

FL03. **FIR-SPRUCE/PACHISTIMA–COLD LIGHT-COLORED SOILS** (ABBI2-PIEN/PAMY). Subalpine fir-Engelmann spruce/pachistima–Cryoboralfs–Slopes, 9,800-10,900 ft



NUMBER OF SAMPLES	9, soil descriptions from 4; 1 not assigned to a CT (total 10)
ELEVATION	10,312 ft (9,840-10,860 ft); 3,143 m (2,999-3,310 m)
AVERAGE ASPECT	352°M (r = 0.30)
LITHOLOGY	Granite, sandstone, tuff
FORMATIONS¹	A variety
LANDFORMS	Soil creep slopes [80%]
SLOPE POSITIONS	Backslopes
SLOPE SHAPES	Linear both horizontally and vertically
SLOPE ANGLE	24.7% (3-40%)
SOIL PARENT MATERIAL	Mostly colluvium [80%]
COARSE FRAGMENTS	6.0% (0-10%) cover on surface, 66.4% (56-77%) by volume in soil
SOIL DEPTH	76 cm (57-111 cm); 29.8 in (22-44 in)
MOLLIC THICKNESS	6 cm (4-9 cm); 2.3 in (2-4 in)
TEXTURE	Sandy clay loam, loam, clay loam, organic, or clay surface; Sandy clay loam, sandy loam, clay loam, silt loam, clay, or sandy clay subsurface
SOIL CLASSIFICATION	All deep Cryoboralfs
TOTAL LIVE COVER	238.7% (135.0-451.5%)
NUMBER OF SPECIES	18.2 (9-27)
TOTAL LIVE COVER/NO. SPECIES	15.2% (6.1-32.0%)
CLIMATE	Outside rainshadow or in partial rainshadow. Moderately cool, moderately moist forest.
WATER	The shaded understory, large number of layers, and considerable litter and duff layer maintain good soil moisture through the growing season.

Key to Community Types

1. Subalpine fir >35% cover. Dominated by Engelmann spruce, >50% cover. Lodgepole pine absent or subordinate to fir and spruce. Aspen conspicuous but subordinate to spruce and fir. Forest fleabane (EREX4) >5% cover **A**
1. Subalpine fir 35% cover. Lodgepole pine or aspen dominant one of them >30%, usually >45%. Forest fleabane absent or rarely <5% cover (2)
2. Lodgepole pine dominant or codominant, 45-95% cover. Aspen absent to <5% cover. Elk sedge absent to 70% cover **B**
2. Aspen dominant or codominant 30-95% cover. Lodgepole pine minor or codominant, 5-50% cover. Elk sedge >10% cover **C**

Description of Community Types

- A** *Engelmann spruce-subalpine fir-aspen-pachistima-forest fleabane* is dominated by a mixed stand of Engelmann spruce (>50% cover), subalpine fir (>30%) and aspen (>25%). Lodgepole pine may or may not be present. Forest fleabane is >5% cover, and elk sedge is absent to <5% cover.

- B** *Lodgepole pine-Engelmann spruce-subalpine fir-pachistima-common juniper* is dominated by lodgepole pine, >45% cover. Engelmann spruce and subalpine fir vary from absent to subdominant or codominant with lodgepole pine. Aspen is usually absent, but can occur up to 5% cover. Forest fleabane is absent to <5% cover. Lodgepole pine dominated one plot where it was the only tree in a *disclimax* from which spruce and fir were eliminated by some intense set of phenomena.
- C** *Aspen-lodgepole pine-elk sedge-pachistima-common juniper* is dominated by aspen at >30% cover. Lodgepole pine is minor to codominant with aspen. Subalpine fir is absent, and Engelmann spruce varies from absent to minor (<10%). Elk sedge is prominent at 10-80% cover. Forest fleabane is absent.

Communities Not Assigned to a Community Type

- A community where aspen, subalpine fir, and Engelmann spruce are codominant, but lodgepole pine is absent may represent another community type, but is under-represented in our sample.

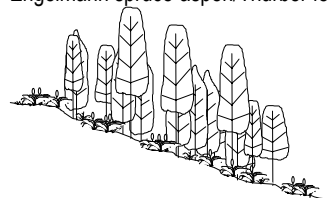
Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Engelmann spruce-subalpine fir- aspen-pachistima-forest fleabane	10,020 (9,840-10,200) 23.5 (22-25)	74 (71-77) 84 (57-111) 7 (4-9)	8 0 PN	142 (133-151) 12 (7-18) 22 (2-42) 23 (22-24)	24 (20-27) 199 (166-232) 8.9 (6.1-11.6)
B. Lodgepole pine-Engelmann spruce- subalpine fir-pachistima-common juniper	10,507 (10,040- 10,860) 25.5 (3-40)	59 (56-61) 68 (60-75) 5 (5-5)	7 (3-10) 2 (2-2) LM	110 (75-200) 61 (34-86) 17 (0-66) 7 (1-23)	18 (9-26) 195 (135-288) 14.0 (6.4-32.0)
C. Aspen-lodgepole pine-elk sedge- pachistima-common juniper	* *	* * *	* * MS	92 (71-115) 69 (61-85) 77 (11-140) 85 (40-160)	15 (13-18) 324 (182-451) 21.1 (14.0-25.1)

*. Unknown: measurements were not taken in this CT.

	TREES	
ABBI2	Abies bifolia	subalpine fir
PIEN	Picea engelmannii	Engelmann spruce
PICO	Pinus contorta	lodgepole pine
POTR5	Populus tremuloides	quaking aspen
PSME	Pseudotsuga menziesii	Douglas-fir
	SHRUBS	
ARUV	Arctostaphylos uva-ursi	kinnikinnick
JUCO6	Juniperus communis	common juniper
MARE11	Mahonia repens	Oregon-grape
PAMY	Paxistima myrsinites	mountain-lover
ROWO	Rosa woodsii	Woods rose
SHCA	Shepherdia canadensis	russet buffaloberry
VAMY0	Vaccinium myrtillus ssp. oreophilum	Rocky Mountain whortleberry
VASC	Vaccinium scoparium	broom huckleberry
	GRAMINOIDS	
BRCA10	Bromopsis canadensis	fringed brome
CAGE2	Carex geyeri	elk sedge
ELGL	Elymus glaucus	blue wildrye
	FORBS	
ACLA5	Achillea lanulosa	western yarrow
ARCO9	Arnica cordifolia	heartleaf arnica
ARLA8	Arnica latifolia	broadleaf arnica
EREX4	Erigeron eximius	forest fleabane
FRVI	Fragaria virginiana	Virginia strawberry
GERI	Geranium richardsonii	Richardson geranium
LAL2	Lathyrus leucanthus	aspen peavine
LUAR3	Lupinus argenteus	silvery lupine
ORPA3	Oreochrysum parryi	Parry goldenweed
OSDE	Osmorhiza depauperata	sweet cicely
PSMO	Pseudocymopterus montanus	mountain parsely
SESE2	Senecio serra	butterweed groundsel

FL04A. **SPRUCE-ASPEN/TIMBER OATGRASS–COLD CLAY SOILS** (PIEN-POTR5/FETH-DAIN).

Engelmann spruce-aspen/Thurber fescue-timber oatgrass–Cryoboralfs–Gentle backslopes

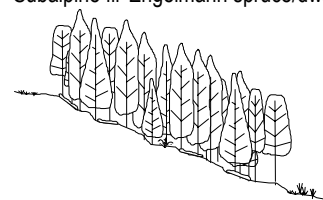


SAMPLES	2, no soil descriptions
ELEVATION	10,400 ft (3,170 m)
LITHOLOGY	Breccia and welded Tuff
FORMATIONS¹	Tpl, Taf
LANDFORMS	Soil creep slopes
SLOPE POSITIONS	Backslopes and lower backslopes
SLOPE SHAPES	Linear to convex horizontally, Linear vertically
SLOPE ANGLE	7%
PARENT MATERIAL	Colluvium
COARSE FRAGMENTS	2% (1-3%) cover on surface; 59% (56-61%) by volume in soil
SOIL DEPTH	68 cm (60-75 cm); 26.5 in (23-30 in)
MOLLIC THICKNESS	5 cm (2 in)
TEXTURE	–
SOIL CLASSIFICATION	Cryoboralfs and Cryochrepts
TOTAL LIVE COVER	195% (190-199%)
NO. SPECIES	31.5 (31-32)
TLC/NS	6.2% (6.1-6.2%)
CLIMATE	Cold, moderately moist forest

Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Gramin. Forbs	No. Species Total Live Cover, % TLC/NS, %
FL04A. Aspen-Engelmann spruce-timber oatgrass- Thurber fescue	10,400 7	* * *	2 (1-2) 12 (8-15)	85 (80-90) 5 (3-6) 87 (82-92) 18 (14-21)	32 (31-32) 195 (190-199) 6.2 (6.1-6.2)

*. Unknown: measurements were not taken in this CT.

FL04B. FIR-SPRUCE/DWARF BILBERRY–COLD SANDY SOILS–GLACIAL (ABBI2-PIEN/VACE).
Subalpine fir-Engelmann spruce/dwarf bilberry–Sandy Cryoboralfs–Gentle granitic glacial slopes



SAMPLES	1, with a soil description
ELEVATION	10,240 ft (3,120 m)
LITHOLOGY	Granite
FORMATIONS ¹	Tmi
LANDFORMS	Lateral moraines
SLOPE POSITIONS	Footslopes
SLOPE SHAPES	Undulating both horizontally and vertically
SLOPE ANGLE	12%
PARENT MATERIAL	Glacial
COARSE FRAGMENTS	2% cover on surface; 52% by volume in soil
SOIL DEPTH	82 cm (32 in)
MOLLIC THICKNESS	5 cm (2 in)
TEXTURE	Sandy clay loam surface, loamy sand subsurface
SOIL CLASSIFICATION	Cryoboralfs, deep
TOTAL LIVE COVER	115%
NO. SPECIES	22
TLC/NS	5.2
CLIMATE	Cold, moderately dry forest

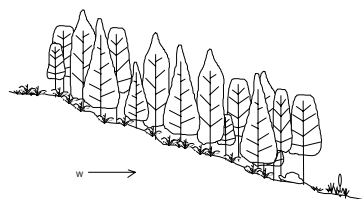
Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Cover, %: Trees Shrubs Gramin. Forbs	No. Species Total Live Cover, % TLC/NS, %
FL04B. Lodgepole pine- Engelmann spruce-dwarf bilberry	10,240 12	52 82 5	2 *	73 34 3 5	22 115 5.2

*. Unknown: measurements were not taken in this CT.

Common Species in both FL04A and FL04B

	TREES	
PIEN	<i>Picea engelmannii</i>	Engelmann spruce
PICO	<i>Pinus contorta</i>	lodgepole pine
POTR5	<i>Populus tremuloides</i>	quaking aspen
	SHRUBS	
ARUV	<i>Arctostaphylos uva-ursi</i>	kinnikinnick
JUCO6	<i>Juniperus communis</i>	common juniper
VACE	<i>Vaccinium cespitosum</i>	dwarf bilberry
	GRAMINOIDS	
DAIN	<i>Danthonia intermedia</i>	timber oatgrass
FEID	<i>Festuca idahoensis</i>	Idaho fescue
FETH	<i>Festuca thurberi</i>	Thurber fescue
KOMA	<i>Koeleria macrantha</i>	prairie junegrass
	FORBS	
ASAL7	<i>Astragalus alpinus</i>	alpine milkvetch
IRMI	<i>Iris missouriensis</i>	wild iris

FL05. **FIR-SPRUCE/ELK SEDGE—COLD LIGHT-COLORED CLAY SOILS—GENTLE** (ABBI2-PIEN/CAGE2). Subalpine fir-Engelmann spruce/elk sedge—Cryoboralfs, clayey—Gentle slopes, 10,000-10,700 ft



NUMBER OF SAMPLES	31, soil descriptions from 5 of these (total 31)
ELEVATION	10,377 ft (10,020-10,670 ft); 3,163 m (3,054-3,252 m)
AVERAGE ASPECT	200°M (r = 0.54)
LITHOLOGY	Basalt, sandstone, limestone, shale
FORMATIONS [†]	Tbb, Pmb, Jj, Kdb
LANDFORMS	Soil creep slopes [80%]
SLOPE POSITIONS	Backslopes [60%], shoulders, and summits
SLOPE SHAPES	Linear [80%] to convex both horizontally and vertically
SLOPE ANGLE	14.9% (0-34%)
SOIL PARENT MATERIAL	Colluvium [60%], residuum, or colluvium over residuum
COARSE FRAGMENTS	1.8% (0-10%) cover on surface, 63.9% (31-81%) by volume in soil
SOIL DEPTH	67 cm (30-116 cm); 26.5 in (12-46 in)
MOLLIC THICKNESS	18 cm (1-65 cm); 6.9 in (0-26 in)
TEXTURE	Organic or clayey surface; clay subsurface
SOIL CLASSIFICATION	Cryoboralfs [80%] or Argic Cryoborolls
TOTAL LIVE COVER	262.0% (139.5-525.0%)
NUMBER OF SPECIES	19.4 (12-40)
TOTAL LIVE COVER/NO. SPECIES	15.0% (4.4-32.8%)
CLIMATE	Cool to cold, moist to moderately moist Subalpine forest.
WATER	The several layers, the rhizomatous elk sedge, and the abundant litter and duff retain soil moisture through the growing season.

Key to Community Types

1. Engelmann spruce >70% cover, dominant over other trees **A**
1. Engelmann spruce absent or <70% cover, subordinate to other trees (2)

2. Subalpine fir present and reproducing, >5% cover. Big sagebrush absent or <10% cover..... (3)
2. Subalpine fir absent or <5% cover. Big sagebrush (ARTR2) sometimes >10% cover (4)

3. Common juniper (JUCO6) usually absent, but rarely up to 10%. Subalpine fir always present but <15% cover **B**
3. Common juniper always present, 5-30%. Subalpine fir usually absent, but sometimes up to 40% **C**

4. Lodgepole pine >60% cover, dominant over other trees. Aspen absent or <10% cover**E**
 4. Lodgepole pine <60% cover, usually subordinate to other trees. Aspen usually >20%, rarely absent..... (5)
5. Big sagebrush prominent, >10% cover **D**
 5. Big sagebrush absent or <10% (6)
6. Engelmann spruce >5%. Common juniper always present, 5-35% cover**C**
 6. Engelmann spruce absent or <5% cover. Common juniper <10% cover**E**

Description of Community Types

- A** *Engelmann spruce-aspen-elk sedge* is dominated by Engelmann spruce at >75% cover. Aspen is absent to abundantly codominant. Subalpine fir is absent to <15% cover. Lodgepole pine is sometimes present, <10% cover.
- B** *Aspen-Engelmann spruce-subalpine fir-elk sedge* Aspen cover is >60% and usually dominant over other trees. Engelmann spruce is always present, but <40% cover. Subalpine fir is always present, but <15% cover. Lodgepole pine is sometimes present in smaller quantities.
- C** *Aspen-lodgepole pine-Engelmann spruce-common juniper-elk sedge-rose* is usually a codominant stand of aspen, lodgepole pine, and Engelmann spruce; aspen usually leads in cover. Subalpine fir is usually absent, but rarely up to 40% and codominant. Common juniper is always present, 5-30% cover.
- D** *Lodgepole pine-elk sedge-kinnikinnick* is usually a codominant stand of lodgepole pine, aspen, and Engelmann spruce, but sometimes lodgepole pine is the only tree. Big sagebrush is prominent, 10-50% cover.
- E** *Lodgepole pine-Engelmann spruce-elk sedge-strawberry* is dominated by lodgepole pine, >60% cover. Engelmann spruce is always present, but <15% cover. Aspen is absent or sometimes <10% cover.
- F** *Aspen-elk sedge-strawberry* is dominated by aspen, >55% cover, often >70%. There may or may not be lodgepole pine, up to 80% cover. Subalpine fir and Engelmann spruce are absent to obscure, <5%.

Communities Not Assigned to a Community Type

- A community dominated by a mix of aspen and subalpine fir, with Engelmann spruce subordinate to these. The understory is sparse, with elk sedge the most conspicuous species. This community has probably experienced some sort of grazing disturbance, since aspen codominance usually means dense understories.

Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Engelmann spruce-aspen-elk sedge	10,480 17	60 50 1	* * LS	164 (86-300) 4 (0-6) 72 (56-80) 36 (2-86)	17 (13-22) 275 (162-472) 17.9 (7.4-31.5)
B. Aspen-Engelmann spruce-subalpine fir-elk sedge	10,390 (10,380-10,400) 18.5 (12-25)	50 (31-69) 41 (30-51) 13 (13-13)	* * LM	136 (98-205) 7 (0-18) 75 (19-140) 72 (14-155)	16 (13-22) 290 (140-474) 18.0 (9.3-26.4)
C. Aspen-lodgepole pine-Engelmann spruce-common juniper-elk sedge-rose	10,320 (10,200-10,440) 7.5 (5-10)	55 31 10	1 * MS	151 (95-200) 32 (7-70) 61 (20-120) 41 (14-70)	19 (12-27) 285 (241-363) 16.0 (9.1-21.0)
D. Lodgepole pine-elk sedge- kinnikinnick	* *	* * *	* * EM	69 (40-131) 44 (15-81) 75 (41-125) 31 (11-50)	14 (13-18) 220 (169-271) 15.6 (12.1-20.2)
E. Lodgepole pine-Engelmann spruce- elk sedge-strawberry	10,620 (10,550-10,670) 4.1 (0-9)	64 81 13	4 (0-10) 13 (1-25) LM	81 (75-93) 7 (0-19) 60 (31-78) 29 (16-63)	30 (19-40) 176 (140-206) 6.3 (4.4-8.8)
F. Aspen-elk sedge-strawberry	10,229 (10,020-10,360) 22.4 (6-34)	72 (59-81) 86 (43-116) 25 (5-65)	7 (7-7) 0 (0-25) EM	97 (77-136) 15 (0-25) 96 (63-185) 93 (7-235)	22 (15-31) 301 (206-525) 14.8 (9.9-32.8)

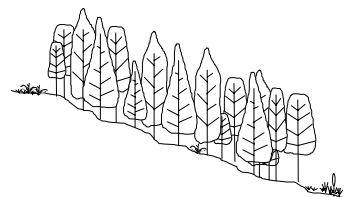
*. Unknown: measurements were not taken in this CT.

	TREES	
ABBI2	Abies bifolia	subalpine fir
PIEN	Picea engelmannii	Engelmann spruce
PICO	Pinus contorta	lodgepole pine
POTR5	Populus tremuloides	quaking aspen
	SHRUBS	
ARUV	Arctostaphylos uva-ursi	kinnikinnick
MARE11	Mahonia repens	Oregon-grape
ROWO	Rosa woodsii	Woods rose
SHCA	Shepherdia canadensis	russet buffaloberry
SYRO	Symphoricarpos rotundifolius	mountain snowberry
	GRAMINOIDS	
ACNE9	Achnatherum nelsonii	Nelson's needlegrass
BRCA10	Bromopsis canadensis	fringed brome
BRPO5	Bromopsis porteri	nodding brome
CAGE2	Carex geyeri	elk sedge
CARO5	Carex rossii	Ross sedge
FESA	Festuca saximontana	Rocky Mountain fescue
FETH	Festuca thurberi	Thurber fescue
KOMA	Koeleria macrantha	prairie junegrass
POPR	Poa pratensis	Kentucky bluegrass

	FORBS	
ACLA5	Achillea lanulosa	western yarrow
ARCO9	Arnica cordifolia	heartleaf arnica
EREX4	Erigeron eximius	forest fleabane
ERSU2	Erigeron subtrivialis	threenerve fleabane
FRVI	Fragaria virginiana	Virginia strawberry
FRSP	Frasera speciosa	monument plant
GASE6	Galium septentrionale	northern bedstraw
GERI	Geranium richardsonii	Richardson geranium
LALE2	Lathyrus leucanthus	aspen peavine
LUAR3	Lupinus argenteus	silvery lupine
MAST4	Maianthemum stellatum	star Solomon-plume
MELA3	Mertensia lanceolata	lanceleaf bluebells
ORPA3	Oreochrysum parryi	Parry goldenweed
OSDE	Osmorhiza depauperata	sweet cicely
PEBR	Pedicularis bracteosa	bracted lousewort
SESE2	Senecio serra	butterweed groundsel
TAOF	Taraxacum officinale	common dandelion
THFE	Thalictrum fendleri	Fendler meadow-rue

FL06. FIR-SPRUCE/MOSS—COLD LIGHT-COLORED SOILS—NORTHERLY (ABBI2-PIEN/MOSS).

Subalpine fir-Engelmann spruce/moss—Cryoboralfs—Gentle to steep northerly slopes, 9,700-11,100 ft



NUMBER OF SAMPLES	13, soil descriptions from 5 of these (total 13)
ELEVATION	10,389 ft (9,700-11,050 ft); 3,166 m (2,956-3,368 m)
AVERAGE ASPECT	27°M (r = 0.63)
LITHOLOGY	Various
FORMATIONS¹	Various
LANDFORMS	Moraines [33%], soil creep slopes [33%], benches, and slump-earthflows
SLOPE POSITIONS	Backslopes, upper backslopes, and summits [80%]
SLOPE SHAPES	Mostly linear both horizontally and vertically
SLOPE ANGLE	15.2% (3-64%)
SOIL PARENT MATERIAL	Colluvial [60%] or glacial [40%]
COARSE FRAGMENTS	2.7% (0-8%) cover on surface, 56.1% (33-82%) by volume in soil
SOIL DEPTH	74 cm (42-115 cm); 29.0 in (17-45 in)
MOLLIC THICKNESS	11 cm (2-20 cm); 4.3 in (1-8 in)
TEXTURE	Clay loam, sandy clay loam, or loam surface; Clay, sandy clay loam, clay loam, sandy clay, or loam subsurface
SOIL CLASSIFICATION	Cryoboralfs [80%]
TOTAL LIVE COVER	129.6% (63.4-214.0%)
NUMBER OF SPECIES	23.1 (11-34)
TOTAL LIVE COVER/NO. SPECIES	6.2% (3.9-19.5%)
CLIMATE	In partial (moderate) rainshadow to deep rainshadow. Cold, moderately moist to dry, very well protected, very shaded forest.
WATER	There is little cover here to hold moisture, but the litter and duff layer does hold some.

Key to Community Types

1. Subalpine fir >15%, often subdominant..... **A**

1. Subalpine fir absent to very minor, <5%..... **B**

Community Type Descriptions

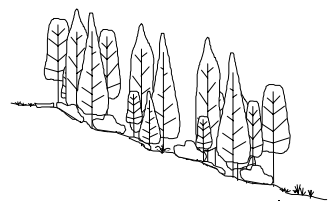
A *Subalpine fir-moss* has Engelmann spruce dominant and >55% cover. Subalpine fir is codominant, always present, >15%. Aspen and lodgepole pine are rare and minor.

B *Engelmann spruce-moss* has Engelmann spruce dominant usually alone, >35% cover. Lodgepole pine and aspen are usually absent, but sometimes one is minor, <10%.

Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Subalpine fir-moss	10,441 (9,700-11,050) 18.8 (3-64)	60 (33-82) 76 (42-115) 13 (8-20)	2 (1-5) 3 (1-10) LS	102 (75-123) 5 (0-10) 5 (0-16) 24 (3-94)	26 (19-34) 136 (110-185) 5.4 (4.6-6.4)
B. Engelmann spruce-moss	10,286 (9,745-10,560) 8.1 (5-13)	40 63 2	4 (1-8) 12 (3-25) LS	100 (63-200) 8 (0-25) 4 (0-8) 7 (0-16)	19 (11-26) 119 (63-214) 7.6 (3.9-19.5)

	TREES	
ABBI2	Abies bifolia	subalpine fir
PIEN	Picea engelmannii	Engelmann spruce
PICO	Pinus contorta	lodgepole pine
POTR5	Populus tremuloides	quaking aspen
	SHRUBS	
JUCO6	Juniperus communis	common juniper
RICO2	Ribes coloradense	Colorado currant
RIMO2	Ribes montigenum	mountain gooseberry
SHCA	Shepherdia canadensis	russet buffaloberry
	GRAMINOIDS	
CAGE2	Carex geyeri	elk sedge
FETH	Festuca thurberi	Thurber fescue
LUPA4	Luzula parviflora	millet woodrush
	FORBS	
AMLA6	Amerosedum lanceolatum	yellow stonecrop
ARCO9	Arnica cordifolia	heartleaf arnica
ARLA8	Arnica latifolia	broadleaf arnica
ASFO	Aster foliaceus	leafybract aster
CACO6	Cardamine cordifolia	heartleaf bittercress
LALE2	Lathyrus leucanthus	aspen peavine
LIBO3	Linnaea borealis	American twinflower
MECI3	Mertensia ciliata	mountain bluebells
MIPE	Mitella pentandra	five-stamen miterwort
ORPA3	Oreochrysum parryi	Parry goldenweed
OSDE	Osmorhiza depauperata	sweet cicely
PERA	Pedicularis racemosa	sickletop lousewort
POPU3	Polemonium pulcherrimum	Jacob's ladder
PSLE	Psychrophila leptosepala	elkslip marsh-marigold
RAUN	Ranunculus uncinatus	hooked buttercup
SETR	Senecio triangularis	arrowleaf groundsel

FL07. **FIR-SPRUCE/BUFFALOBERRY–COLD LIGHT-COLORED SOILS** (ABBI2-PIEN/SHCA). Subalpine fir-Engelmann spruce/buffaloberry–Cryochrepts–Slopes, >10,000 ft



NUMBER OF SAMPLES	12, soil descriptions from 1 of these (total 12)
ELEVATION	10,100 ft; 3,078 m
AVERAGE ASPECT	27°M (r = 0.63)
LITHOLOGY	Granite and Schist
FORMATIONS ¹	Xg, Xb
LANDFORMS	Lateral moraines
SLOPE POSITIONS	Footslopes
SLOPE SHAPES	Undulating both horizontally and vertically
SLOPE ANGLE	22.0% (21-23%)
SOIL PARENT MATERIAL	Glacial
COARSE FRAGMENTS	16.9% (14-20%) cover on surface, 52.6% (28-77%) by volume in soil
SOIL DEPTH	45 cm; 17.7 in
MOLLIC THICKNESS	6 cm; 2.4 in
TEXTURE	Sandy clay loam-sandy loam surface, loamy sand-sand subsurface
SOIL CLASSIFICATION	Cryochrepts, moderately deep
TOTAL LIVE COVER	196.2% (141.7-264.0%)
NUMBER OF SPECIES	13.4 (9-20)
TOTAL LIVE COVER/NO. SPECIES	15.7% (7.1-25.2%)
CLIMATE	Moderately cool to cold, dry Subalpine forest.
WATER	The soil surface is moderately dry year-round, although the litter and duff retains noticeable moisture in the soil during the growing season.

Key to Community Types

1. Aspen present and >5%, but clearly subordinate to lodgepole pine **C**
1. Aspen absent or isolated stems, <2% cover (2)
2. Subalpine fir present and >0.5%, but clearly subordinate to lodgepole pine **A**
2. Subalpine fir absent **B**

Descriptions of Community Types

- A** *Lodgepole pine-buffaloberry-common juniper-Rocky Mountain whortleberry* is dominated by lodgepole pine at >40% cover. Subalpine fir is present but sparse, with >0.5% cover. Aspen is absent. Engelmann spruce (40% cover) is codominant with lodgepole pine in one plot.
- B** *Lodgepole pine-Engelmann spruce-buffaloberry-Rocky Mountain whortleberry* is dominated by lodgepole pine at >45% cover. Aspen and subalpine fir are absent; Engelmann spruce is sparse, at >0.5% cover.
- C** *Lodgepole pine-aspen-sparse Engelmann spruce-buffaloberry-common juniper-elk sedge* supports obvious aspen at >5% cover. Lodgepole pine is clearly dominant, but in two plots aspen shares dominance. Engelmann spruce is present at >0.5%, sometimes as much as 10% cover.

Communities Not Assigned to a Community Type

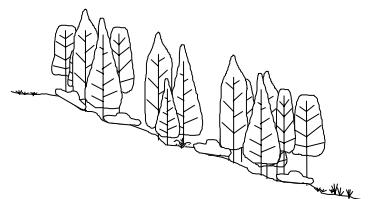
- One community was dominated by lodgepole pine, with a small amount of aspen, but no Engelmann spruce or subalpine fir. It has a sparse understory dominated by buffaloberry.

Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Lodgepole pine-buffaloberry- common juniper-Rocky Mtn. whortleberry	10,100 (10,100-10,100) 22.0 (21-23)	53 (28-77) 45 (45-45) 6 (6-6)	17 (14-20) * MS	75 (46-87) 78 (53-116) 8 (0-26) 18 (2-61)	17 (13-20) 179 (142-264) 10.7 (7.1-13.9)
B. Lodgepole pine-Engelmann spruce-buffaloberry-Rocky Mtn. whortleberry	* *	* * *	* * LM	55 (37-86) 93 (45-145) 10 (0-30) 29 (2-70)	12 (11-15) 187 (148-256) 15.6 (12.1-23.3)
C. Lodgepole pine-aspen-sparse Engelmann spruce-buffaloberry- common juniper-elk sedge	* *	* * *	* * LM-MS	82 (72-92) 108 (85-145) 13 (5-21) 21 (2-41)	11 (9-15) 223 (196-255) 20.8 (17.0-25.2)

*. Unknown: measurements were not taken in this CT.

	TREES	
PIEN	Picea engelmannii	Engelmann spruce
PICO	Pinus contorta	lodgepole pine
POTR5	Populus tremuloides	quaking aspen
PSME	Pseudotsuga menziesii	Douglas-fir
	SHRUBS	
ARUV	Arctostaphylos uva-ursi	kinnikinnick
JUCO6	Juniperus communis	common juniper
MARE11	Mahonia repens	Oregon-grape
PAMY	Paxistima myrsinites	mountain-lover
ROWO	Rosa woodsii	Woods rose
RUID	Rubus idaeus	American red raspberry
VACE	Vaccinium cespitosum	dwarf bilberry
VAMYO	Vaccinium myrtillus ssp. oreophilum	Rocky Mountain whortleberry
	GRAMINOIDS	
BRPO5	Bromopsis porteri	nodding brome
CACA4	Calamagrostis canadensis	bluejoint reedgrass
CAREX	Carex	sedge
CAGE2	Carex geyeri	elk sedge
CARO5	Carex rossii	Ross sedge
ELEL5	Elymus elymoides	bottlebrush squirreltail
	FORBS	
ARNIC	Arnica	arnica
ARCO9	Arnica cordifolia	heartleaf arnica
ASTRA	Astragalus	milkvetch
CHDA2	Chamerion danielsii	fireweed
FRVI	Fragaria virginiana	Virginia strawberry
LIBO3	Linnaea borealis	American twinflower
ORLU2	Orthocarpus luteus	yellow owl-clover

FL08. **SPRUCE/GOOSEBERRY–COLD UPPER-SUBALPINE SLOPES** (PIEN/RIMO2). Engelmann spruce/mountain gooseberry–Cold Cryic soils–Gentle upper-Subalpine slopes, 10,100-12,200 ft



NUMBER OF SAMPLES	7, soil descriptions from 2 of these (total 7)
ELEVATION	11,182 ft (10,160-12,125 ft); 3,408 m (3,097-3,696 m)
AVERAGE ASPECT	137°M (r = 0.44)
LITHOLOGY	Breccia, granite, shale
FORMATIONS¹	Tpl, Tmi, Xg, Km
LANDFORMS	Soil creep slopes [50%], various others
SLOPE POSITIONS	Backslopes [60%], various others
SLOPE SHAPES	Linear [50%] to various horizontally, Linear [67%] vertically
SLOPE ANGLE	14.3% (4-31%)
SOIL PARENT MATERIAL	Colluvium [83%]
COARSE FRAGMENTS	7.7% (0-18%) cover on surface, 56.6% (51-62%) by volume in soil
SOIL DEPTH	50 cm (25-64 cm); 19.8 in (10-25 in)
MOLLIC THICKNESS	12 cm (0-25 cm); 4.6 in (0-10 in)
TEXTURE	Clay loam or silt loam surface, sandy clay loam, sandy loam, or clay loam subsurface
SOIL CLASSIFICATION	Cryoboralfs [67%], Cryorthents, or Cryochrepts
TOTAL LIVE COVER	190.9% (121.0-365.5%)
NUMBER OF SPECIES	21.7 (10-30)
TOTAL LIVE COVER/NO. SPECIES	9.7% (5.1-19.6%)
CLIMATE	Cold to very cold, moderately moist upper Subalpine forest.
WATER	Water is frozen most of the year, and freezes most nights. "Growing season" is measured in hours, not days. Little water is available to plants in liquid form.

Key to Community Types

1. Mountain gooseberry conspicuous, >20% cover. Rocky Mountain whortleberry absent or <1%. Silvertop sedge absent. Lodgepole pine absent or <25% cover **A**
1. Mountain gooseberry present but not conspicuous, 5-20% cover. Rocky Mountain whortleberry prominent, >20% cover. Silvertop sedge (CAFO3) >10%. Lodgepole pine dominant or codominant, >30% cover **B**

Description of Community Types

- A** *Engelmann spruce-mountain gooseberry* Engelmann spruce is dominant at >35% cover, often >55%. The understory is dominated by mountain gooseberry at 20-50% cover. One plot had subalpine fir and lodgepole pine as subordinates to spruce.
- B** *Lodgepole pine-sparse Engelmann spruce-Rocky Mountain whortleberry-mountain gooseberry* Lodgepole pine is dominant over Engelmann spruce. Subalpine fir is absent. Mountain gooseberry is 5-20% cover. Rocky Mountain whortleberry is conspicuous at >20% cover. Silvertop sedge is >10% cover.

Communities Not Assigned to a Community Type

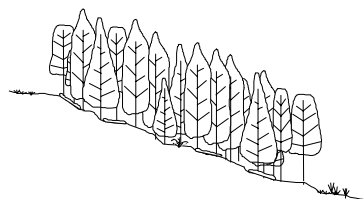
- One community was dominated by mountain gooseberry, with trees absent to sparse.

Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Engelmann spruce-mountain gooseberry	11,093 (10,160-12,125) 10.3 (4-16)	57 (51-62) 47 (25-62) 15 (4-25)	5 (0-11) 4 (3-4) PN	81 (36-107) 27 (8-50) 17 (2-50) 39 (11-64)	20 (10-28) 163 (121-216) 9.4 (5.8-19.6)
B. Lodgepole pine-sparse Engelmann spruce-Rocky Mtn. whortleberry- mountain gooseberry	11,540 31	* 64 0	18 12 LM	52 (33-70) 31 (27-35) 108 (30-186) 69 (18-120)	27 (23-30) 260 (154-366) 10.5 (5.1-15.9)

*. Unknown: measurements were not taken in this CT.

	TREES	
ABBI2	Abies bifolia	subalpine fir
PIEN	Picea engelmannii	Engelmann spruce
PICO	Pinus contorta	lodgepole pine
	SHRUBS	
VAMYO	Vaccinium myrtillus ssp. oreophilum	Rocky Mountain whortleberry
	GRAMINOIDS	
BRCA10	Bromopsis canadensis	fringed brome
CACA4	Calamagrostis canadensis	bluejoint reedgrass
CAFO3	Carex foenea	silvertop sedge
CAGE2	Carex geyeri	elk sedge
DECE	Deschampsia cespitosa	tufted hairgrass
FEBRC	Festuca brachyphylla ssp. coloradensis	alpine fescue
KOMA	Koeleria macrantha	prairie junegrass
POFE	Poa fendleriana	muttongrass
PONE2	Poa nervosa	Wheeler bluegrass
TRSP2	Trisetum spicatum	spike trisetum
	FORBS	
ACLA5	Achillea lanulosa	western yarrow
ANPA4	Antennaria parvifolia	smalleaf pussytoes
ARCO9	Arnica cordifolia	heartleaf arnica
ASTRA	Astragalus	milkvetch
CHDA2	Chamerion danielsii	fireweed
COSC2	Conioselinum scopulorum	Rocky Mountain hemlock-parsley
DEBA2	Delphinium barbeyi	Barbey larkspur
FRVI	Fragaria virginiana	Virginia strawberry
LUAR3	Lupinus argenteus	silvery lupine
MECI3	Mertensia ciliata	mountain bluebells
ORPA3	Oreochrysum parryi	Parry goldenweed
PECR	Pedicularis crenulata	lousewort
PERA	Pedicularis racemosa	sickletop lousewort
PEWH	Penstemon whippleanus	beardtongue
POPU3	Polemonium pulcherrimum	Jacob's ladder
SOMU	Solidago multiradiata	mountain goldenrod
TAOF	Taraxacum officinale	common dandelion
THSP	Thalictrum sparsiflorum	few-flowered meadow-rue

FL09. **FIR-SPRUCE/WHORTLEBERRY–COLD LIGHT-COLORED SOILS** (ABBI2-PIEN/VAMYO).
 Subalpine fir-Engelmann spruce/Rocky Mountain whortleberry–Cryochrepts and Cryoboralfs–Moderate
 slopes, 10,600-11,400 ft



NUMBER OF SAMPLES	16, soil descriptions from 2; 1 not assigned to a CT (total 17)
ELEVATION	10,951 ft (10,600-11,385 ft); 3,338 m (3,231-3,470 m)
AVERAGE ASPECT	204°M (r = 0.12)
LITHOLOGY	Granite, breccia, shale, sandstone, siltstone
FORMATIONS [†]	Xg, Tmi, Tpl, Km, Jmj
LANDFORMS	Soil creep slopes [60%] and ridges
SLOPE POSITIONS	Backslopes, shoulders, and summits
SLOPE SHAPES	Linear to convex horizontally, Linear vertically
SLOPE ANGLE	14.2% (3-29%)
SOIL PARENT MATERIAL	Colluvium [60%] or residuum
COARSE FRAGMENTS	0.4% (0-1%) cover on surface, 66.5% (54-79%) by volume in soil
SOIL DEPTH	42 cm (31-59 cm); 16.4 in (12-23 in)
MOLLIC THICKNESS	2 cm (0-7 cm); .9 in (0-3 in)
TEXTURE	Loamy sand or clay loam surface;
SANDY SUBSURFACE	loamy sand, sandy clay, or sand
SOIL CLASSIFICATION	Cryochrepts or Cryoboralfs
TOTAL LIVE COVER	210.4% (99.3-375.5%)
NUMBER OF SPECIES	16.3 (9-31)
TOTAL LIVE COVER/NO. SPECIES	14.1% (3.2-26.8%)
CLIMATE	Cold, moist to moderately dry Subalpine forest.
WATER	Water is frozen most of the year and unavailable to plants. Litter and duff retain some soil moisture during the growing season.

Key to Community Types

1. Engelmann spruce >50%, dominant over other trees. Lodgepole pine 1-30%, clearly subordinate to spruce. Elk sedge sometimes absent..... **A**
1. Engelmann spruce <40% (sometimes absent), subordinate to other trees. Lodgepole pine 1-70%, sometimes dominant. Elk sedge always present, >5%..... (2)
2. Aspen conspicuous, >20%, sometimes dominant..... (3)
2. Aspen absent or minor, <10% cover **C**
3. Engelmann spruce >10%. Aspen >60%, dominant. Lodgepole pine <10% **D**
3. Engelmann spruce absent or very minor, <5%. Lodgepole pine >40%, dominant or codominant with aspen (20-50%) **B**

Description of Community Types

- A** *Engelmann spruce-Rocky Mountain whortleberry* is dominated by Engelmann spruce at >50% cover, with lodgepole pine subdominant at <30% cover. Aspen is absent. Rocky Mountain whortleberry cover is >25%. Elk sedge is sometimes absent.
- B** *Lodgepole pine-aspen-elk sedge-Rocky Mountain whortleberry* is dominated by lodgepole pine at >40% cover, with aspen codominant at >20% cover. Engelmann spruce is absent. Elk sedge cover is 5-80%.
- C** *Lodgepole pine-Rocky Mountain whortleberry-elk sedge* is dominated by lodgepole pine at >20% cover, with Engelmann spruce subdominant at >10% cover. Aspen is absent. Elk sedge cover is 20-60%.
- D** *Aspen-Engelmann spruce-lodgepole pine-common juniper-elk sedge-Rocky Mountain whortleberry* is dominated by aspen at >60% cover, with Engelmann spruce at >10% cover. Lodgepole pine is present in small quantities, <10% cover. Elk sedge cover is >50%.

Communities Not Assigned to a Community Type

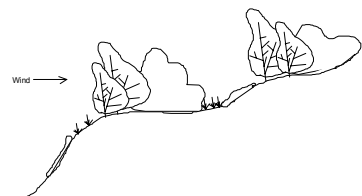
- A community codominated by Engelmann spruce and lodgepole pine, in which grouse whortleberry (VASC) replaces Rocky Mountain whortleberry. This actually represents a different type, named for grouse whortleberry (Daubenmire 1952, Wirsing and Alexander 1975, Hoffman and Alexander 1976, Pfister and others 1977) which is unusual in our area.

Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoid Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Engelmann spruce-Rocky Mtn. whortleberry	10,951 (10,600-11,385) 14.2 (3-29)	67 (54-79) 42 (31-59) 2 (0-7)	1 (0-1) 5 (0-10) PN	70 (56-75) 50 (30-83) 14 (1-61) 17 (0-46)	21 (14-31) 151 (99-212) 8.7 (3.2-15.1)
B. Lodgepole pine-aspen-elk sedge-Rocky Mtn. whortleberry	*	*	20 (0-20) *	86 (66-102) 47 (10-116) 34 (5-80) 25 (1-63)	13 (9-16) 192 (112-259) 14.4 (11.7-17.4)
C. Lodgepole pine-Rocky Mtn. whortleberry-elk sedge	*	*	*	56 (32-79) 52 (10-72) 55 (20-100) 60 (21-105)	15 (9-18) 223 (157-297) 15.6 (10.9-21.2)
D. Aspen-Engelmann spruce-lodgepole pine-common juniper-elk sedge-Rocky Mtn. whortleberry	*	*	*	96 (76-116) 90 (90-90) 95 (95-95) 85 (75-95)	16 (14-18) 366 (356-376) 23.3 (19.8-26.8)

*, Unknown: measurements were not taken in this CT.

	TREES			GRAMINOIDS (cont.)	
ABBI2	Abies bifolia	subalpine fir	FETH	Festuca thurberi	Thurber fescue
JUSC2	Juniperus scopulorum	Rocky Mountain juniper	POFE	Poa fendleriana	muttongrass
PIEN	Picea engelmannii	Engelmann spruce	POPR	Poa pratensis	Kentucky bluegrass
PICO	Pinus contorta	lodgepole pine		FORBS	
POTR5	Populus tremuloides	quaking aspen			
	SHRUBS				
ARUV	Arctostaphylos uva-ursi	kinnikinnick	ACLA5	Achillea lanulosa	western yarrow
JUCO6	Juniperus communis	common juniper	ARCO9	Arnica cordifolia	heartleaf arnica
MARE11	Mahonia repens	Oregon-grape	ASTRA	Astragalus	milkvetch
RICO2	Ribes coloradense	Colorado currant	CHDA2	Chamerion danielsii	fireweed
ROWO	Rosa woodsii	Woods rose	FRVI	Fragaria virginiana	Virginia strawberry
SYRO	Symphoricarpos rotundifolius	mountain snowberry	GERI	Geranium richardsonii	Richardson geranium
VAMO	Vaccinium myrtillus ssp. oreophilum	Rocky Mountain whortleberry	LALF2	Lathyrus leucanthus	aspen peavine
VASC	Vaccinium scoparium	broom huckleberry	LIBO3	Linnaea borealis	American twinflower
	GRAMINOIDS		LUAR3	Lupinus argenteus	silvery lupine
BRCA10	Bromopsis canadensis	fringed brome	OSDE	Osmorhiza depauperata	sweet cicely
CAGE2	Carex geyeri	elk sedge	PEPR7	Pedicularis procera	Gray's lousewort
CARO5	Carex rossii	Ross sedge	SETR	Senecio triangularis	arrowleaf groundsel
			TAOF	Taraxacum officinale	common dandelion
			TRIFO	Trifolium	clover

FL10. **FIR-SPRUCE/GRAYLEAF WILLOW TREELINE–WIND-SCARRED** (ABB12-PIEN/SAGL). Subalpine fir-Engelmann spruce/grayleaf willow Krummholz forest–Cryorthents–Treeline wind-scarred slopes, 11,620-12,000 ft



NUMBER OF SAMPLES	2, soil descriptions from 1 of these (total 2)
ELEVATION	11,670 ft (11,620-11,720 ft); 3,557 m (3,542-3,572 m)
AVERAGE ASPECT	204°M (r = 0.12)
LITHOLOGY	Various
FORMATIONS¹	Various
LANDFORMS	Benches, ridges, cirques
SLOPE POSITIONS	Upper backslopes, shoulders, summits
SLOPE ANGLE	18.3% (18-19%)
SOIL PARENT MATERIAL	Colluvium or residuum
COARSE FRAGMENTS	21.8% (14-30%) cover on surface, 0.0% (70-70%) by volume in soil
SOIL DEPTH	34 cm (15-53 cm); 13.4 in (6-21 in)
MOLLIC THICKNESS	9 cm (0-17 cm); 3.3 in (0-7 in)
TEXTURE	Silty loam surface, silty clay loam subsurface, cobbly or rocky
SOIL CLASSIFICATION	Cryorthents
TOTAL LIVE COVER	164.6% (118.8-210.4%)
NUMBER OF SPECIES	35.5 (24-47)
TOTAL LIVE COVER/NO. SPECIES	4.7% (4.5-5.0%)
CLIMATE	Cold to very cold, very windy. These sites at the Subalpine-Alpine ecotone are between the Subalpine and Alpine climates as well.
WATER	Water is frozen most of the year; plant growth is very slow. Air temperature falls below freezing most nights.

Community Type

A *Krummholz Engelmann spruce-grayleaf willow* has patches of Engelmann spruce and grayleaf willow, sometimes with bog birch included, alternating with patches of lower Alpine vegetation, usually dominated by species such as dwarf bilberry, Kobresia-like sedges, alpine fescue, or alpine avens.

Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Krummholz Engelmann spruce- grayleaf willow	11,670 (11,620-11,720) 18.3 (18-19)	70 (70-70) 34 (15-53) 9 (0-17)	22 (14-30) 3 (1-5)	29 (25-32) 93 (78-109) 10 (4-16) 31 (9-53)	36 (24-47) 165 (119-210) 4.7 (4.5-5.0)

	TREES	
ABB12	Abies bifolia	subalpine fir
PIEN	Picea engelmannii	Engelmann spruce
	SHRUBS	
BEG1	Betula glandulosa	bog birch
JUCO6	Juniperus communis	common juniper
VACE	Vaccinium cespitosum	dwarf bilberry
VAMO	Vaccinium myrtillus ssp. oreophilum	Rocky Mountain whortleberry

	GRAMINOIDS	
CAST36	Calamagrostis stricta	Northern reedgrass
CARO5	Carex rossii	Ross sedge
POHU	Podagrostis humilis	alpine bentgrass
	FORBS	
ACROT	Acomastylis rossii ssp. turbinata	alpine avens
ANNAZ3	Anemonastrum narcissiflorum ssp. zephyrum	narcissus anemone
PEGR2	Pedicularis groenlandica	elephantella
POPU3	Polemonium pulcherrimum	Jacob's ladder
FORB	forb unknown	unknown forb

FL11. **LIMBER PINE/COMMON JUNIPER–ROCKS** (PIFL2/JUCO6). Limber pine/common juniper–Very shallow soils–Rocky bouldery convex ridges and rockslides, >9,000 ft



NUMBER OF SAMPLES	2, soil descriptions from 1 of these (total 2)
ELEVATION	9,390 ft (9,000-9,780 ft); 2,862 m (2,743-2,981 m)
AVERAGE ASPECT	204°M (r = 0.12)
LITHOLOGY	Granite
FORMATIONS¹	Xg
LANDFORMS	Ridges, rockslides, rock falls
SLOPE POSITIONS	Upper backslopes, shoulders
SLOPE SHAPES	Convex both horizontally and vertically
SLOPE ANGLE	37.6% (22-53%)
SOIL PARENT MATERIAL	Residuum or colluvium
COARSE FRAGMENTS	36.5% (20-53%) cover on surface, 0.0% (79-79%) by volume in soil
SOIL DEPTH	28 cm; 11 in
MOLLIC THICKNESS	10 cm; 4 in
TEXTURE	Various textures, very bouldery (rocky)
SOIL CLASSIFICATION	Lithic Eutroboralfs or Lithic Cryorthents, shallow to very shallow
TOTAL LIVE COVER	61.7% (29.6-93.9%)
NUMBER OF SPECIES	27.5 (27-28)
TOTAL LIVE COVER/NO. SPECIES	2.2% (1.1-3.4%)
CLIMATE	Cold, very dry, rocky Subalpine rockslides.
WATER	Very little water on these sites in any form, even in the "soils," since they are made of rocks.

Community Type

A *Limber pine-Douglas-fir-common juniper-ocean spray-rocky* is dominated by rocks and gravity, but limber pine is usually 10-30% cover. Douglas-fir may be subdominant among trees. The shrub and herbaceous layers are sparse to very sparse, with dry site shrubs such as common juniper and ocean-spray the only conspicuous species.

Community Type	Elevation, ft Slope, %	Coarse, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %
A. Limber pine- Douglas-fir- common juniper- ocean spray-rocky	9,390 (9,000-9,780) 37.6 (22-53)	79 28 10	36 (20-53) 6 (1-10)	36 (27-45) 9 (2-16) 8 (0-16) 9 (1-17)	28 (27-28) 62 (30-94) 2.2 (1.1-3.4)

	TREES	
PICO	Pinus contorta	lodgepole pine
PIFL2	Pinus flexilis	limber pine
	SHRUBS	
RIIN2	Ribes inerme	whitestem currant
ROWO	Rosa woodsii	Woods rose
SYRO	Symphoricarpos rotundifolius	mountain snowberry
	GRAMINOIDS	
AGSC5	Agrostis scabra	rough bentgrass
CAGE	Carex geophila	dryland sedge
FETH	Festuca thurberi	Thurber fescue
PONE12	Poa nemoralis ssp. interior	interior bluegrass

	FORBS	
CIAU3	Cilinia austromontana	spotted saxifrage
FRVI	Fragaria virginiana	Virginia strawberry

